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Volume VI of the "Flore de France" of Rouy and Foucaud, devoted to Rosaceæ, appears as the 1899 *Annales de l'Académie de La Rochelle*, and is ascribed to Rouy and Camus.

The public school department of Carthage, Mo., where nature study of the most practical kind has taken firm root through the efforts of Professor Stevens, the superintendent, has now begun the publication of a series of "Nature Study Leaflets," dealing with common objects.

Progress in American agriculture and the sciences upon which it rests is well sketched in the voluminous *Yearbook* of the United States Department of Agriculture for 1899, recently issued.

Part IX, recently published, completes the second volume of the *Bulletin of the Bussey Institution*, which has been in progress since the year 1877. A table of contents and an index make the subject-matter of the volume accessible.

Forestry in Sweden is reported on by General Andrews, late United States Minister to that country, in a Senate Document recently issued.

The conditions of success in grafting are discussed by Daniel in current numbers of the *Revue générale de botanique*.

Dr. P. Van Romburgh publishes an important paper on Caoutchouc and Gutta-percha in the Dutch Indies, as No. 39 of the *Mededeelingen* of the Buitenzorg Botanic Garden.

A biographical sketch, with portrait, of Klatt, whose writings on Iris and certain Compositæ are familiar to all working botanists, is reprinted by Voigt from the *Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten* for 1898.

A portrait of the late Sir J. B. Lawes, whose field experiments on the physiology of agricultural plants, extending over many years, are known to all botanists, appears in *Science Gossip* for October.

PALEONTOLOGY.

Traquair's Presidential Address, Bradford, 1900. — The Zoölogical Section of the British Association, in its choice of Dr. Traquair for president, paid a graceful tribute to a scientist whose researches during the past thirty-five years have conduced more to our knowledge of Paleozoic fishes than those of any other single investigator. And the propriety of electing a paleontologist to preside over its sessions is abundantly confirmed by the brilliant address of sixteen closely printed pages with which its sittings were opened.

In this essay Dr. Traquair has done for the class of fishes what Marsh attempted for American fossil vertebrates in general, and what Osborn accomplished for the Mammalia, in their addresses before the sister association[1] in this country some years ago; and these three summaries, taken together, constitute a very important chapter in the literature of vertebrate paleontology. Although not retrospective in an historical sense, Dr. Traquair's paper is in effect a clarified review, expressed in terms of evolution, of the leading philosophic deductions which the science of ichthyic paleontology has afforded up to the present time. Its significance consists in a clearer recognition of the relationships between different groups of fishes, together with a more precise indication of their lines of descent; and it contains also critical observations on various disputed points, such as the origin of paired fins, development of dental plates and dermal armor from shagreen-like scales, atrophy of the lower jaw and shoulder-girdle, modification of the caudal fin, and similar issues. And in conclusion it is stated that "the paleontology of fishes is not less emphatic in the support of the doctrine of descent than that of any other division of the animal kingdom"; also that "we do not and cannot know the oldest fishes, as they would not have had hard parts for preservation, but we may hope to come to know many more old ones, and older ones still, than we do at present."

The author devotes special consideration to those ancient forms whose structure he has so ably elucidated in earlier memoirs. As for the ostracoderms, a most enigmatical group, which he at one time supposed were derived from the primitive elasmobranch stem (owing to the resemblance of Thelodus scales to shagreen), an independent origin is now admitted to be possible; but the idea is discredited that they had any share in the evolution of more recent types of fishes. The Cœlolepidæ, to which "Cephalaspis as well as Pteraspis and its allies are traceable," were certainly shark-like creatures, even if they were not offshoots from some primitive form of shark.

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[1] Marsh, O. C. Introduction and Succession of Vertebrate Life in America, *Proc. Amer. Assoc. Adv. Sci.*, Nashville Meeting, 1873.

Osborn, H. F. The Rise of the Mammalia in North America, *ibid.*, Madison Meeting, 1893.

A novel and somewhat surprising interpretation of the equally problematical arthrodires is given, to the effect that they are teleostomes belonging to the order Actinopterygii. Newberry, it is true, imagined a resemblance to exist between Macropetalichthys and recent sturgeons; but we know now that this genus has nothing to do with coccosteans, and Newberry totally misapprehended its structure. The lack of a shoulder-girdle and lower jaw (properly speaking) in all coccosteans, — an anomaly which they share in common with ostracoderms, — and the peculiar arrangement and mode of growth of the dermal plates, are characters which, to our mind at least, are irreconcilable with actinopterygian affinities. Although functional "mandibles" and "maxillaries" are often present, yet they are evidently only modified dermal plates of the same nature as the body armoring; and the former are suspended in soft tissues without any articulation with the cranium or other bones whatsoever. They are no more homologous with the jaws of bony fishes than is the so-called "clavicular" with a pectoral arch. Bashford Dean would exclude arthrodires from fishes altogether, as Cope did the ostracoderms; and elsewhere a tendency may be noticed looking toward the revival of M'Coy's Placodermata.

Turning to the elasmobranchs, Dr. Traquair again surprises us by declaring that their paleontological history does not throw any definite light on the disputed origin of paired limbs or "on the question whether the so-called archipterygium is the primary form of paired fin in the fish, or only a secondary modification." Nevertheless, he cautiously admits that "the paired fins of the Upper Devonian shark, Cladoselache, as described by Bashford Dean, Smith Woodward, and others, seem to favor the lateral fold theory." Next follows a very interesting and very learned discussion of the Crossopterygii, the Dipnoi, and Actinopterygii, into which, however, space forbids us to enter. His conclusions regarding the first two groups are that "the Crossopterygii were not derived *from* the Dipnoi, and that the modern representatives of the latter group are degenerate forms; yet as to the immediate ancestry of the Dipnoi themselves and the diphyletic origin of the so-called archipterygium, we had best for the present keep an open mind." It need scarcely be added that this lucid and timely essay of Dr. Traquair's is of prime importance, not only to paleontologists, but to zoölogists everywhere.

C. R. E.